

**Comments for Draft Revisions (*Not Applicable to Directives; Refer to Directive Management Officer for Directive Comment Format*)**

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**Comments Submitted By:** Field Comment Disposition

**Organization:** Norman Pereira, AIR-130, Section 133

**Phone:** 202-267-1639

#	Document Name	Page Number	Paragraph Number	Referenced Text	Comment/Rationale or Question	Proposed Resolution	Comment Type (Conceptual, Editorial, or Format)	Disposition/Response to Comment
ACE	AC 20-XX Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft  Avi Acharya 316-946-4192	1-1	1.2.3	"This AC does not apply to part 23 aircraft that are less than 6000 lb."	The failure and operational characteristics of Lithium batteries would be the same regardless of the size/weight of the aircraft.	Delete this line.	Conceptual	Disagreed- per Small Airplane Directorate requirement.
ACE	AC 20-XX Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft  Ben Tyson 316.946.4174	Cover	N/A	"...airworthiness requirements for installation of lithium batteries on aircraft (14 CFR Part 21, 23, 25, 27, 29)."	Change to, "installation of <b>rechargeable</b> lithium batteries" AND Remove "21" since there are no Part 21 aircraft. Part 21 is procedural.	Add the word "rechargeable" and remove "21".	Editorial Conceptual	Agreed with clarification- see section 1.1.3 for AC callout of rechargeable lithium batteries as lithium batteries throughout the document. Part 21 applies to the certification basis.
ACE	AC 20-XX  Ben Tyson 316.946.4174	2-1	2.2	Section numbering.	The organization of this AC is confusing. Sec. 2.2 is titled "Acceptable Means of Compliance (MOC) for Installation Approval", but the following section is 2.3 "Test Requirements" which should be a subparagraph of 2.2.	Consider re-organizing for clarity. Suggest making secs. 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, and 2.9 subparagraphs to sec. 2.2. since these are all aspects of the acceptable means of compliance.	Conceptual	Disagree- section numbering is a matter of preference. Does not add anything to the AC.

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ACE	AC 20-XX Ben Tyson 316.946.4174	2-1	2.2.1.3	System safety assessment;	Need to clarify that the system safety assessment doesn't need to be submitted concurrently with the cert plan.	Change text in its entirety to, "Description of the proposed system safety assessment methodology;"	Conceptual	Agreed- Applicant must provide at a minimum a system safety plan in order for the ACO to assess the scope of the project.
ACE	AC 20-XX Ben Tyson 316.946.4174	2-1	2.2.1.7 2.2.1.8	"Instructions for continued airworthiness; and"  "Compliance and substantiation documentation."	Need to clarify that the ICA and the compliance documents don't need to be submitted concurrently with the cert plan.	Change 2.2.1.7 to "Plan for Instructions for Continued Airworthiness; and" AND Change 2.2.18 to, "List of compliance and substantiation documentation."	Conceptual	Agree- Applicant must provide at a minimum a draft plan of the ICA in order for the ACO to assess the scope of the project.
ACE	AC 20-XX Ben Tyson 316.946.4174	2-2, 2-3	2.2.2.1	Table 1	The title of this table is "Airworthiness Regulations..." so para. 21.50(b) does not belong in the list, since it is not an Airworthiness Regulation. This requirement is addressed satisfactorily by the inclusion of 2x.1529 later in the list.	Remove 21.50 from Table 1.	Conceptual	Disagree- 21.50 is an airworthiness regulation.
ACE	AC 20-XX Ben Tyson 316.946.4174	2-2, 2-3	2.2.2.1	Table 1	The list of 14 CFR Sections should be organized in numeric order. Some of the rules listed are out of sequence which is confusing and hurts readability. The ones I saw out of order were: 23.867, 2x.1431, 2x.1365, 2x.1367	Rearrange list in numeric order.	Conceptual	Agree- Updated document to sequentially list the regulations.
ACE	AC 20-XX Ben Tyson 316.946.4174	2-2, 2-3	2.2.2.1	Table 1	Some applicable CFRs seem to be missing.	Suggest adding: 25.981 23.1306 23.1308 25.1729	Conceptual	Disagree- The Table 1 is not meant to be a comprehensive list.
ACE	AC 20-XX Ben Tyson 316.946.4174	2-2, 2-3	2.2.2.1	Table 1	29.1353 is listed twice. The first instance reads, "§25/29.1353" and the second reads, "§29.1353"	Remove the second instance of 29.1353.	Conceptual	Agreed

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ACE	AC 20-XX Ben Tyson 316.946.4174	2-3	2.2.2.1	After Table 1, text reads, "A typical special condition and intent is provided in Appendix 3 and a typical means of compliance (MOC) for the special condition is provided in Appendix 4."	These references to the appendices are incorrect.	Change references to "Appendix D" in the first instance, and "Appendices E and F" in the second instance.	Editorial	Agreed
ACE	AC 20-XX Ben Tyson 316.946.4174	2-3	2.3.1.1.1	RTCA/DO-160G	Is it necessary to limit this AC specifically to DO-160G? Most TSOs have not yet been updated to require rev G. This seems unnecessarily limited. Note that DO-311 does not specify a particular revision of DO-160.	Change to, "RTCA/DO-160 latest revision, or as specified in the applicable TSO."	Conceptual	Disagreed- The statement does take into account the later revision.
ACE	AC 20-XX Ben Tyson 316.946.4174	2-4	2.3.3.3	"Demonstrate that the battery system functions during normal aircraft operation."	The battery system should function PROPERLY, not just function (e.g. erratically, improperly).	Change to, "Demonstrate that the battery system functions properly during normal aircraft operation."	Conceptual	Agreed
ACE	AC 20-XX Ben Tyson 316.946.4174	2-5	2.5	"Any lithium batteries that use software must comply with RTCA/DO-178C..."	Is it necessary to limit this AC specifically to DO-178C? Most TSOs, including C179a, still require only DO-178B. This seems unnecessarily limited.	Change wording to "must comply with RTCA/DO-178 Revision B or later FAA-approved revision. For TSOA articles, the applicant must comply with the software requirements of the applicable TSO(s)."  Alternatively, copy the wording from AC 20-150B Sec. 5.2, which states, "Software Qualification: You should follow the guidance in AC 20-115C, Airborne Software Assurance, dated July 19, 2013."	Conceptual	Disagree- An applicant can use other means for software approval so long as the ELOS is evaluated and approved by the ACO.

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ACE	AC 20-XX  Ben Tyson 316.946.4174	2-5	2.6	"...should comply with the most recent revision of RTCA/DO-254..."	Is it necessary to limit this AC to the most recent revision of DO-254? This seems unnecessarily limited. Also the word "should" is not strong enough, it should be a "must" as it does in sec. 2.5 for software.	Change wording to "must comply with RTCA/DO-254 (original release) or later FAA-approved revision. For TSOA articles, the applicant must comply with the airborne electronic hardware requirements of the applicable TSO(s)."  Alternatively, copy the wording from AC 20-150B Sec. 5.3 which states, "Hardware Qualificaion: You should follow the guidance in AC 20-152, RTCA, Inc., Document RTCA/DO-254, Design Assurance Guidance for Airborne Electronic Hardware, dated June 30, 2005."	Conceptual	Disagree- An applicant can use other means for airborne electronic hardware approval so long as the ELOS is evaluated and approved by the ACO.
ACE	AC 20-XX  Ben Tyson 316.946.4174	2-6	2.7	State of Charge	Section 2.7 is informational, and should be in the background section. There is nothing for the applicant to do, and this info is unrelated to the Cert process.	Move the information on "State of Charge" in 2.7 to another section where it makes more sense, or consider re-wording.	Conceptual	Agreed- The SOC section was modified to link it to certification.
ACE	AC 20-XX  Ben Tyson 316.946.4174	A-1	Appendix A	Table A-1	The references to the appendices are incorrect for small/medium and large batteries.	On the "Small and Medium" rows, far right column, change "Appendix D" to "Appendix E"  On the "Large" row, far right column, change "Refer to Appendix E" to "Refer to Appendix F".	Editorial	Agreed- Updated document.
ACE	Lithium Battery AC	2-2	Table 1	EMI testing is missing.	EMI testing should be included in the list of rules.	Include 23/25/27/29.1431	Conceptual	Disagreed- it is included-see page 2-3
ACE	Lithium Battery AC	A-1	Table A-1	Compliance with 25.1709 is listed under the Small and Medium batteries.	Compliance is 25.1709 is not required, unless the certification basis has been upgraded through a significant project or it is a new TC.	Maybe change the 25.1709 wording to "as appropriate".	Conceptual	Disagreed- 25.1709 must be addressed for all new lithium battery projects.

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ACE	Lithium Battery AC	1-2	1.3.1	Entire paragraph	This AC does not talk about carry on devices that contain them. It is realized that that is difficult to manage but something should be said about this.	State that operators are responsible for managing carry-on (including cargo) and any devices containing lithium batteries need to be identified as hazardous material.	Conceptual	Disagreed- Portable equipment is out of scope of this AC.
ACE	Lithium Battery AC	3-2	3.2.5	Check periodically to ensure the venting system is securely connected and oriented in accordance with the maintenance manual's installation procedures.	The venting system should be checked to ensure that the venting is unobstructed.	Check periodically to ensure the venting system is securely connected, unobstructed and oriented in accordance with the maintenance manual's installation procedures.	Editorial	Disagreed- This evaluation is project specific.
ACE	Lithium Battery AC	D-1 and D-2	Appendix D	Special Condition Requirements 1, 2, 3 and 4	Probability of failures for Special Condition Requirements #1 - 4 are equivalent for Parts 23, 25, 27, 29 but AC 23.1309 documents relief (probabilities less than Part 25, for example) for Part 23 aircraft (Class 1,2 and 3). Rewrite of Part 23 is recognizing different certification requirements from other Parts. It is not understood why the probabilities are the same for all Parts for these 4 requirements.	Provide relief for the probabilities of failure for Class 1, 2 and 3 Part 23 aircraft in Special Condition Requirements 1 through 4.	Conceptual	Agree with comment- The Directorate and ACO have the authority to provide relief per AC 23.1309.
ACE	AC 20-XX	1-2	1.3.2	"Intro of lithium batteries into aircraft raises some concerns about associated battery monitoring systems (temperature and state of charge) and should be evaluated and tested ..	Comment: clarify the concerns raised with the battery monitoring systems and should these systems monitor and display temperature, pressure, and state of charge to the flight crew and/or maintenance crews?	The AC in this paragraph or other sections that mention monitoring systems is not clear as to what is needed to be monitored for flight crew and/or maintenance crew and if and only if the special condition #8 would call out the requirement for the monitoring system (see Appendix D-3)		Disagreed- This evaluation is project specific and need to be evaluated during installation and certification. Specific design criteria is not appropriate for the FAA to stipulate.
ACE								

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ACE	AC 20-XX	3-1	3.2.3	State of Charge - "safeguards must be implemented to ensure the aircraft does not begin flight with a battery not sufficiently charged to accomplish ..."	Does this paragraph imply that the crew should be provided a monitoring system depicting state of charge for all rechargeable batteries on the aircraft and subsequent AFMS procedures?	Clarify in the AC when a monitoring system is needed for the flight crew and what battery state of conditions should be displayed (temperature, pressure, state of charge)		Disagreed- This evaluation is project specific and need to be evaluated during installation and certification. Specific design criteria is not appropriate for the FAA to stipulate.
ACE								
ACE	AC 20-XX	D-3	SCR #8	Special Condition Requirement #8	Should battery cell temperature and battery pressure also be displayed to flight crew members.	Include the display of battery parameters of temperature, pressure and state of charge to flight crew members.		Disagreed- This evaluation is project specific and need to be evaluated during installation and certification. Specific design criteria is not appropriate for the FAA to stipulate.
ACE								
ACE	AC 20-XX	1-2	1.3	Rechargeable Lithium Batteries Covered	It may be obvious - but what is the definition of a rechargeable lithium battery? Meaning - If the battery is designed as a rechargeable lithium battery but is not connected to aircraft power thus is installed so that it is not possible to recharge - Is this a rechargeable or non rechargeable battery?	Include a definition and/or scope as to what configuration this AC is applicable to.		Disagree- The AC is applicable for all installed rechargeable lithium batteries. See section 1.1.1 of the AC. If it is not installed as rechargeable lithium battery this AC does not apply.
ACE	AC 20-XX	General	General	"... follow the manufacturer's recommended ...."	Several places in this AC it is stated to "... follow the manufacturer's recommended ...." what if in the installed configuration, these recommendation from the battery manufacture are not sufficient? At the end of the day the applicant who is installing these batteries as part of type design is the one responsible for the installation and not the battery manufacture.	In stead of "... follow the manufacturer's recommended ...." suggest wording such as " .... follow the manufacturer's recommended procedures if they are acceptable for the installed configuration"		Disagreed- The installer uses the manufacturer's recommended procedures in order to show compliance to the airworthiness regulations. Ultimately it is the installers responsibility to show compliance to the regulations.

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ACE	AC 20-XX	2-6	2.8	".... Some types of lithium cells use electrolytes in a liquid state that are know to be flammable." and 2.8.1 states "All material used must be self-extinguishing."	What us our requirement for testing individual components for flammability requirements? Are we saying that if the any of the individual components are flammable then that element is not allowed? This is different to what is required by DO-160G Section 26.			Agreed- Document Updated
ACE	AC 20-XX	B-2	B.3	Orders and Handbooks	Why is TSO-C179(a) not referenced in this AC? This TSO is for Installed Rechargeable Lithium Batteries. Also - This AC has additional requirements not covered by TSO-C179 9(a). Understanding that TSOs are not an installation approval, however, if by this AC, the TSO for Lithium batteries are not sufficient, then a revision or change to TSO-C179(a) should go along with this clearance record.			Dsagreed- The AC is an installation guidance and the TSO is a design and production approval and not an installation approval.
ACE	Lithium Battery AC	2-Feb	Table 1	EMI testing is missing.	EMI testing should be included in the list of rules.	Include 23/25/27/29.1431	Conceptual	Disagreed- it is included-see page 2-3
ACE	Lithium Battery AC	A-1	Table A-1	Compliance with 25.1709 is listed under the Small and Medium batteries.	Compliance is 25.1709 is not required, unless the certification basis has been upgraded through a significant project or it is a new TC.	Maybe change the 25.1709 wording to "as appropriate".	Conceptual	Disagreed- 25.1709 must be addressed for all new lithium battery projects.
ACE	Lithium Battery AC	2-Jan	1.3.1	Entire paragraph	This AC does not talk about carry on devices that contain them. It is realized that that is difficult to manage but something should be said about this.	State that operators are responsible for managing carry-on (including cargo) and any devices containing lithium batteries need to be identified as hazardous material.	Conceptual	Disagreed- Portable equipment is out of scope of this AC.



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ACE	Lithium Battery AC	2-Mar	3.2.5	Check periodically to ensure the venting system is securely connected and oriented in accordance with the maintenance manual's installation procedures.	The venting system should be checked to ensure that the venting is unobstructed.	Check periodically to ensure the venting system is securely connected, unobstructed and oriented in accordance with the maintenance manual's installation procedures.	Editorial	Disagreed- This evaluation is project specific.
ACE	Lithium Battery AC	D-1 and D-2	Appendix D	Special Condition Requirements 1, 2, 3 and 4	Probability of failures for Special Condition Requirements #1 - 4 are equivalent for Parts 23, 25, 27, 29 but AC 23.1309 documents relief (probabilities less than Part 25, for example) for Part 23 aircraft (Class 1,2 and 3). Rewrite of Part 23 is recognizing different certification requirements from other Parts. It is not understood why the probabilities are the same for all Parts for these 4 requirements.	Provide relief for the probabilities of failure for Class 1, 2 and 3 Part 23 aircraft in Special Condition Requirements 1 through 4.	Conceptual	Agree with comment- The Directorate and ACO have the authority to provide relief per AC 23.1309.
ANE	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft			General comment	I don't see any specifically suggested testing or external testing documents for Li ion batteries. Is DO-160 adequate? Does DO-347 have adequate testing? Was DO-347 in effect when the B-787 was certified? Has that document been updated since if it was used during the B-787 certification? Hard to tell right now as written.	Please describe any specific tests which should be conducted on these types of batteries. Do the required tests vary depending on the battery size/mass?		Disagreed- DO-160 alone is not sufficient for lithium battery and battery systems. Appendix E and F have specific tests criteria using RTCA DO-347 and 311 that are specific for these types of batteries.
ANE				General Comment	For electric vehicles, are the batteries considered to be part of the engine/propulsion system? If so, does the AC need to reference Part 33 documentation, regulations and policy?	Not sure of a good resolution. This is a real question on my part.		Disagreed- This AC is one means of compliance to the special condition requirements. Electric vehicle is out of scope of this AC.



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ANE				General comment	How about the inclusion somewhere of temperature and pressure sensors and minimum rates of monitoring and sampling? What about limits and required operator warnings? If the temperature rises 10% above ambient or pressure rises similarly or both alert the operator to shut down the device or go into automated failover. Vents help only if they are not blocked. Consider requiring sensors distributed both around the interior cells and on the exterior of the battery container.	Seems like a logical approach to handling a potentially unsafe condition, especially if the size of the device is significant enough to cause significant damage.		Disagreed- The AC provides a means of compliance that the installer can use to The Hazard assessment is on a project by project basis by the ACO.
ANE		A-1	Table A-1	Large Battery Size	Require cells to have automated monitoring of temperature and pressure (assuming volume is restricted to a fixed limit)	Require automated monitoring of temperature and pressure with limits and operator alarms. Require automated shutdown and failover if limits exceeded.		Disagreed- This AC only provide a means of compliance and the applicant may propose their method of compliance based on their specific design.
ANE		B-1	Section B-1	Regulations	Does part 33 need to be included if the battery is part of the propulsion system? For example, the battery might be part of the propulsion system with electric planes.	Maybe include part 33 regulations? Contact EPD for advice and better suggestions.		Disagreed- This AC is one means of compliance to the special condition requiremenst. Electric vehicle is out of scope of the this AC.
ANE		D-1	Section D-1	Special Conditions	Containment, if that is permitted, must not only contain smoke and fire, but radiant heat as well. I am not sure radiant heat is implied by the current Special Conditions? What if the radiant heat melts important structure, insulation, etc.?	Make sure an "containment" option includes all potential threats - radiant heat included.		Disagreed- The RTCA Special Committee , SC225, developed these test and validation criteria with the expertise of battery and aircraft OEM, installers, researchers and regulators

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ANE		D-1	Section D-1	Special Conditions	Please consider adding a special condition for large batteries which includes software controlled temperature and pressure monitoring with automated operator alerts if thresholds are exceeded and automated shutdown and failover if limits are passed.	Consider adding another special condition for large batteries.		Disagreed- This comment is covered by special condition 7 The method of compliance can be either software or hardware or both..
AFS-1	DRAFT AC 20-XX - Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	Page 1-2	1.3.1.5	Special functions batteries (such as flashlights, electronic equipment, life vests, safety equipment, avionics equipment, communications equipment, and emergency medical equipment).	Should this AC address quantity and size limitations for special function batteries to include portable electronic device equipment authorized for use as electronic flight bags which in many cases include external lithium battery packs for use as a power backup mitigation strategy?	Incorporate language within this AC to ensure that any quantity and size limitations are not exceeded (See 49 CFR 175.10). Additional information for consideration: Each spare battery must be individually protected to prevent short circuits by placing the battery in the original retail packaging, by taping over the battery contacts to isolate the terminals, or by placing each battery in a separate plastic bag or protective pouch. Do not permit a loose battery to come in contact with metal objects, such as coins, keys, or jewelry and take steps to prevent crushing, puncturing, or pressure on the battery.	Conceptual: If you deem applicable to this draft AC	Disagreed- This AC only deals with installed lithium battery and battery system and uninstalled Portable equipment (not part of the type design) is out of scope of this AC.



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ASW		2			Implementation is too broad, allow directoraes mor latitude.	<p>The attached speial condition are required for projects that involve installation of lithium batteries when the system safety analysis determines failure conditions of hazardous or catastrophic are associated with the installation. A means of compliance issue paper is required for each lithium battery project when failure condition are determined to be hazardous or catastrophic. The means of compliance may vary based on directorate evaluation of the risk and criticality for the particular product.</p> <p>Project that include installation of of a lithium battery where the system safety analysis identifies associated failure conditions as major, minor, or no safety effect may not require a means of compliance issue paper. The involved directorate will determine which requirements, defined by</p>		concur
						<p>the attached special conditions, should be accomplished for lithium battery installations with major, minor, or no safety effect failure conditions.</p> <p>An advisory circular will provide applicants with guidance on the compliance to these special conditions.</p>		

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		2		Conclusion	Implementation is too broad, allow directorates more latitude.	The Federal Aviation Administration (FAA) has concluded it is appropriate to use special conditions when the system safety assessment has determined a hazardous or catastrophic condition exists to maintain the product's level of safety with the current requirements for other existing types of battery and battery systems.		
ASW	AC-20-XYZ	Page 1-1	Section 1.2.3		Would it not be possible to make this no applicable to rotorcraft? At least not Part 27 VFR?	deleted this section and added a flowchart for evaluation criteria.		Concur - updated document
ASW		Page 2-5	serction 2.4.1.8		Compliance and/or mitigating design features, if appropriate.	Added... and each mitigating design feature.		Concur updated Document
ASW			Section 2.5		I would think that DO-178B may be satisfactory, not sure every project would need to step up to 178C.	The AC 20-115C allows legacy software to use different levels of RTCa DO-178. The AC will still state RTCA DO-178C.,		Non-Concur
ASW		Page 3-1	Section 3.2.4		This section seems to pretty much mandate that lithium batteries have their own logbook. Otherwise, tracking the data mentioned here would be extremely challenging, using aircraft maintenance records alone.	Applicant should choose however they would like this information documented. FAA should not specify the method.		Non-Concur
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-2	2.2.2.1, Table 1. Airworthiness regulations concerning Lithium Battery Installations	14 CFR Section and Subject Matter	The materials that are used for Lithium battery cells should be taken into consideration for designing and construction.	Add §§ 23/25/27/29.603.	Conceptual	Agreed but not adopted- The list is a minimum list and does not include all applicable airworthiness regulations.XX.603 is applicable and need to be addressed in all installations.

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ANM1	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	Throughout	Throughout	"...nickel-cadmium and lead-acid batteries..."	The repeated comparison of Lithium battery's to nickel-cadium and lead-acid batteries tends to minimize perception of potential hazards of the later.	Address the comparison of the Lithium batterys to nickel-cadmium and lead-acid batteries in one place, i.e., paragraph 1.3.2	Conceptual	Disagreed- This is used to reiterate when needed.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-1	2.2.1	"Prepare a certification plan that...lithium batteries on the aircraft. It is recommended...scope of the certification project."	We should encourage first time quality in PSCPs. The second sentence begins in a passive tone, i.e., "It is.."	"Prepare a well developed certification plan..." "We recommend..."	Editorial	Disagreed- Does not change the intent.
ANM4	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-1	2.2.1 (2.2.1.1 thru 2.2.1.8)	"Include the following items at a minimum:"	Repeated and redundant information from other material. Additionally, 2.2.1.3, 2.2.1.7 and 2.2.1.8 are compliance data deliverables and should not be incorporated into the PSCP.	"Follow guidance for PSCP/CIP preparation in AC21-40 and CPI Guide." Remove 2.2.1.1 through 2.2.1.8.	Conceptual	Disagreed- Minimum recommended list. Will be evaluated by ACOor ODA.
ANM5	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-1	2.2.2.1	Entire paragraph.	This paragraph could be written more effectively. The word "imposed" has a negative connotation.	Replace with: "Lithium battery installations shall meet all applicable airworthiness regulations listed in Table 1 as a minimum for the product, the guidance in this chapter and any applicable special condition prescribed by the directorate. "	Editorial	Disagree No change in intent.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-2, 2-3	Table 1	14 CFR Section listing	List in numerical order.	An example is 23.867 should follow 23/25/27/29.863.	Format	Agreed- Doxcument updated.

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ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-3	Second to last paragraph following 14 CFR listing	"therefore special conditions will be imposed..."	The word "imposed" has a negative connotation.	Replace the word "imposed" with one of the following suggestions: Introduced, prescribed, or mandated.	Editorial	Disagree- No change in intent.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-3	Last Paragraph following 14 CFR listing	"...however the means of compliance to the requirement may be different for each directorate."	Provides a perception that FAA is not consistent or we are not "one FAA."	Propose replacing "each directorate" with "each aircraft category and type."	Editorial	Disagree- Woeding consistent with certification documents.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-3	2.3.1	Entire paragraph.	Propose referencing the respective TSO for environmental testing requirements to anticipate changes at the TSO level and reduce potential of future contradiction between this AC and the TSO.	Environmental Test Requirements listed in TSO-C???(.).	Conceptual	Disagree- The TSO's are numerous. That will depend on individual TSO and out of scope of this AC.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-3	2.3.2.2.2	"...or the most recent revision:"	This provides an option of either Rev G of DO-160 "or" the most current revision.	See 2.6	Editorial	Disagree- The intent is to use RTCA DO-160G or the later revision. If the applicant want to use a different version they would have to co-ordinate with ACO as normal process.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-4	2.3.1.2.1 thru 2.3.1.2.5	All	These subsections initially appear to be a continuation under 2.3.1.	Indent	Format	Agreed- Document updated.

[For detailed instructions on how to fill out the columns below, please see the Instructions sheet.](#)

<b>Comments Submitted By:</b>			Field Comment Disposition					
<b>Organization:</b>			Norman Pereira, AIR-130, Section 133					
<b>Phone:</b>			202-267-1639					
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-5	2.4.1.8	"...for each requirement."	This appears to mean a separate statement for each rule whereas one would think a statement of compliance for all applicable regulations, guidance, and special conditions would be sufficient.	Omit: "...for each requirement"	Conceptual	Disagreed-- The intent was for evaluation of each requirement.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-5	2.4.2	Second sentence.	There is/are existing guidance for creating System Safety Assessments. We should refer to those existing guidance materials.	Omit second sentence.	Editorial	Agreed-- It is stated in Appendix B and so noted.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-5	"	First sentence: "...to determine the depth of analysis required."	This presents a variable that may be inconsistent between ACOs.	We should provide guidance for establishing an acceptable degree of analysis.	Conceptual	Disagree-- This has to be a case by case basis based on FHA, SSA, FTA and or FMEA.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-5	2.5	Paragraph under "Software."	We should address current and later revisions to DO-178 in a similar manner as shown in 2.6 and 2.3.1.1.1.	"...must comply with the most recent revision of TRCA/DO-254..."	Editorial	Disagree_ Specifically wanted to list RTCA DO-178C. If the applicant wants to use another level, they would have to co-ordinate with ACO/ODA.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-6	2.7	State of Charge	The content is merely informational regarding the battery maintenance and has little value in Chapter 2 regarding Installation.	Remove section 2.7 or move to Chapter 3.	Editorial	Agreed-- Modified section.



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<b>Phone:</b>			202-267-1639					
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-6	2.8	Flammability	The content is merely informational regarding the battery maintenance and has little value in Chapter 2 regarding Installation.	Remove section 2.8 or move to Chapter 1.	Editorial	Disagree- Need to highlight flammability requirements especially since we are dealing with flammable components.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-6	2.8.1	Entire paragraph	Redundant to 14 CFR listing	Remove.	Editorial	Agreed- Document updated.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-6	2.8.2	Entire paragraph.	Provide substance for section 2.8.	Replace existing paragraph under 2.8 with this one.	Editorial	Agreed- Document updated.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-6	2.8.2	(or later amendment)	Provides option of amendment 25-111 regardless of the aircraft certification basis or significance of a later amendment.	Remove "at amendment 25-111"	Editorial	Agreed- Document updated.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-6	2.9.2	Entire sentence.	This is redundant to 2.9.1.7.	Remove 2.9.2 as written.	Editorial	Disagree- No change in intent.

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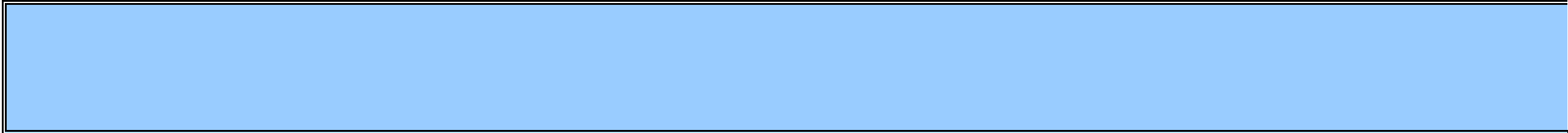
<b>Comments Submitted By:</b>			Field Comment Disposition					
<b>Organization:</b>			Norman Pereira, AIR-130, Section 133					
<b>Phone:</b>			202-267-1639					
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-7	2.9.7	Entire sentence	This is referring to a shop practice and not installation therefore has no relevance to ICA.	Suggest seeking AEG input.	Conceptual	Disagree- Intended as a guidance and is relevant to ICA.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	(1)-(3)	1.4.2.2	Discharge of ...batteries beyond a certain voltage ...be reversed by recharging.	Replace the word beyond with the word below.	Discharge of ... batteries below a certain voltage ... be reversed by recharging.	Editorial	Agreed- Document updated.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	(2)-(3)	2.2.2.1	A typical special condition ...in Appendix 3 and a typical ... in Appendix 4.	The appropriate Appendices are Appendix D, and Appendices E and F.	A typical special condition ... in Appendix D and a typical ... in Appendices E and F.	Editorial	Agreed- reworted document.. Made clearer.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	(2)-(4)	2.3.2	Follow the guidance in ... for large lithium batteries, to show ... imposed by the directorates.	Include battery systems in the description.	Follow the guidance in ... for large lithium batteries and battery systems, to show ... imposed by the directorates.	Editorial	Agreed- Clarified statement
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	(2)-(5)	2.6	Any lithium batteries ...RTCA/DO-254, ...and AC 20-152, RTCA, Inc., ... dated June 30, 2005.	RTCA/DO-254 document is repeated twice with the second time identifying the document release date. Revise paragraph to include document release date on its fist mentioning.	Any lithium batteries ... RTCA/DO-254, Design Assurance Guidance for Airborne Electronic Hardware, dated June 30, 2005, and AC 20-152.	Editorial	Agreed but not adopted- The revision level is adequate.

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<b>Organization:</b>			Norman Pereira, AIR-130, Section 133					
<b>Phone:</b>			202-267-1639					
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	D-1 thru D-4	Appendix D	All	Typical special condition version ANM-100-141217-001 included in the draft AC is not the same version that was submitted for review and was included in draft Policy Statement PS-XYZ-123.	Substitute the Appendix D "Typical Special Condition" with the version included in Policy Statement PS-XYZ-123.	Conceptual	Disagreed- Shown only as typical. The directorate has the aility to issue SC for each project.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	1-3	1.4.2.1	Last sentence.	Grammatical clarity.	Replace the word "increasing" with "increased"	Editorial	Agreed but not adopted- No change in intent.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	1-3	1.4.2.2	Last sentence.	Missing space between words.	Insert space between the words "circuit" and "during."	Editorial	Agreed- Document updated.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	2-1	2.2.1	Second sentence.	Grammatical clarity.	Delete the word "can" so the sentence reads "It is recommended that the certification plan be submitted..."	Editorial	Agreed- Document updated.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	3-3	3.4.1, 3.4.2, 3.4.3, 3.4.4, 3.4.5 and 3.4.6	All	These steps may be redundant. If you are following OEM procedures then these steps could include information rolled up into a single item.	Incorporate into one item.	Conceptual	Disagree- No change in intent.

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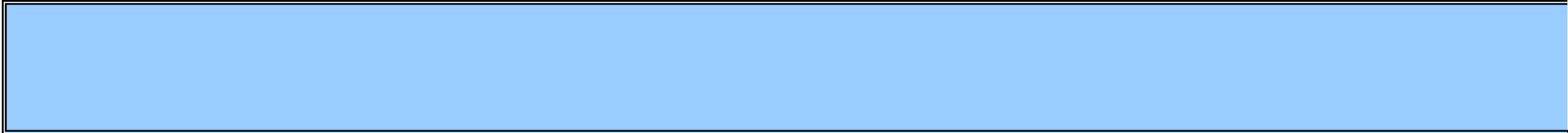
Comments Submitted By:			Field Comment Disposition					
Organization:			Norman Pereira, AIR-130, Section 133					
Phone:			202-267-1639					
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	D-1	Special Condition Requirement #3	All	There is no language in this section requiring a visual indication system in the event of an overpressure relief.	Add the requirement for a visual indication of an overpressure relief.	Conceptual	Disagree- The SC is shown as typical and is the one released on the NPRM. Cannot be changed in this AC.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	E-1	Appendix E	All	Consistent use of terms.	This appendix uses acceptable " <b>method</b> " of compliance, and acceptable " <b>means</b> " of compliance in remainder of document. Should we be using consistent terminology?	Editorial	Agree but not adopted- No change in intent.
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	F-1	Appendix F	All	Consistent use of terms.	This appendix uses acceptable " <b>method</b> " of compliance, and acceptable " <b>means</b> " of compliance in remainder of document. Should we be using consistent terminology?	Editorial	Agree but not adopted- No change in intent.



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Organization:	Norman Pereira, AIR-130, Section 133
Phone:	202-267-1639

35	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	General Comment	General Comment	General Comment	There appears to be a lack of instruction of where to determine an appropriate location for the installation of lithium battery systems.	Add limitation for installation of systems with lithium batteries in aircraft:  "For systems containing other than very small battery sizes, as defined in Appendix A, Table A-1, the system must be installed in a location on the aircraft where in the event of a thermal failure of the battery/battery pack, it can be easily detected by the crew or a smoke detector within 60 seconds."  Justification: FAA has shown as little as 6 loosely packed CR2 batteries are capable of violently overcoming an air-tight metal container (Ref SAFO 10017, dated 10/8/2010). 1 CR2 battery: 600mA x 3 V/1000 = 1.8 Wh is considered a very small battery size per the proposed AC. 6 CR2 batteries = 10.8 Wh, defined as a small battery configuration.	Conceptual	Disagree- This evaluation is based on the particular installation and location. Ned to be evaluated by ACO/ODA at installation.
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	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft					Anything larger than a "very small" battery configuration has a reasonable chance to have the energy potential to cause severe fire/ballistic damage to the aircraft structure. Placing systems with these battery sizes in range for quick detection could significantly increase the probability of a safe diversion and landing.		
ANM	Guidance on Testing and Installation of Rechargeable Lithium Battery and Battery Systems on Aircraft	C-2	C.1.12	Shelf Life. The maximum period at which an undischarged call or battery stored under standard conditions retains 80 percent of rated ampere-hour capacity. The cell/battery manufacturer specifies shelf life.	The 80% number may cause some problems with certain suppliers and aircraft manufacturers that recommend a charge of 35% for storage.	Follow manufacturers recommended % charge and storage period.	Conceptual	Agreed-Document updated.

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<b>Organization:</b>			Norman Pereira, AIR-130, Section 133					
<b>Phone:</b>			202-267-1639					
FAA Tech Center	AC 20-184	Page 1-2	Section 1.3.1	Because of their high energy content and potential thermal instability, lithium batteries can present hazards if improperly designed, tested, used, and/or stored. Failure of a lithium battery, often times results in thermal runaway, which is a self-sustaining uncontrolled increase in pressure and temperature. Thermal runaway often results in fire as the flammable gases vented from the battery are ignited due to the high temperatures. In addition, the unburned vented battery gases can be toxic. Some of the uses for lithium batteries on today's aircraft include, but are not limited to:	Add the text in RED for clarification	Add proposed text stored. Failure of a lithium battery, often times results in thermal runaway, which is a self-sustaining uncontrolled increase in pressure and temperature. Thermal runaway often results in fire as the flammable gases vented from the battery are ignited due to the high temperatures. In addition, the unburned vented battery gases can be toxic.	Conceptual	Agreed- Document updated.
AIR-500	AC 20-184	Title Page,	Paragraph 1		There is an extra space between "(" and "14".	Delete extra space between "(" and "14".	Grammar	Adopted- Updated Document
AIR-500	AC 20-184	Title Page,			"Airworthiness Division" should align with the left margin, under "Manager" and above "Aircraft".	Align "Airworthiness Division" with left margin.	Consistent Formatting	Adopted- Updated Document
AIR-500	AC 20-184	TOC Page i	Paragraph 4 (appendix A) and UNIVERSAL		GPO manual spells "Watt hours" as one word.	Unless it is an FAA convention, consider changing "watt hours" to "watthours" here and throughout the document	Consistent Formatting	Adopted- Updated Document
AIR-500	AC 20-184	Page 1-2	Paragraph 1.4.1		The word "the" is unnecessary between "reliability of" and "aircraft lithium battery".	Delete "the" between "reliability of" and "aircraft lithium battery".	Ease of reading	Adopted- Updated Document
AIR-500	AC 20-184	Page 1-3	Paragraph 1.4.2		After the last sentence, there should be a lead-in sentence to introduce and provide context for the next group of subjects.	Consider adding a lead-in sentence that introduces and provides context for the next group of subjects at the end of the paragraph. For example—  "The following are examples of the possible internal failures of lithium batteries:"	Consistent formatting/Clarity	Adopted-Updated document with slight modification- took out 'internal' since the list includes all possible failures.



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<b>Phone:</b>			202-267-1639					
AIR-500	AC 20-184	Page 1-3	Paragraph 1.4.2.2		In the third (final) sentence, a space is missing between “circuit” and “during”.	Insert a space between “circuit” and “during”.	Clarity	Adopted-Updated Document
AIR-500	AC 20-184	Page 2-1	Paragraph 2.1		In the second sentence, the period after “Type Certification” should be deleted.	Delete the period after “Type Certification”.	Grammar	Adopted-Updated Document
AIR-500	AC 20-184	Page 2-1	Paragraph 2.2.1		In the second sentence, the word “can” following “plan” should be deleted. Also, there should be a comma between “process” and “since” in the same sentence.	Delete “can” after “plan”. Insert a comma between “process” and “since”.	Grammar/Clarity	Adopted-Updated Document
AIR-500	AC 20-184	Page 2-1	Paragraph 2.2.2.1		“The” should be deleted at the beginning of the first sentence.  In the second sentence, replacing “The” at the beginning with “These” would be clearer.	Delete “the” at the beginning of the sentence.  Replace, “The” with “These” at the beginning of the sentence.	Consistent Formatting	Adopted-Updated Document
AIR-500	AC 20-184	Page 2-1	Paragraph 2.2.2.1		The word “shall” is used throughout the document. According to Order 1000.36, FAA Writing Standards, writers should avoid using the word “shall.”	Consider changing “shall” to a more specific word, such as “must,” “may,” “should,” etc., where appropriate, throughout the document.  From pg. 4, Order 1000.36 FAA Writing Standards:  “Avoid using “shall.” Shall is an ambiguous word. It can mean must, ought, or will. While shall cannot mean “should” or “may,” writers have used it incorrectly for those terms and it has been read that way by the courts. Almost all legal writing experts agree that it’s better to use “must” to impose requirements, including contractual requirements.”	Consistent Formatting	Non-Concur- For an AC we have used ‘Shall’ for AC’s since the AC is guidance for one means of compliance. If you use the AC the applicant must use it in its entirety.

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<b>Phone:</b>			202-267-1639					
AIR-500	AC 20-184	Page 2-3	Paragraph 2.2.2.1 (below table 1)		In the first sentence following table 1, it would be less awkward to insert "The following are" at the beginning of the sentence and deleting "are the following" from the end. Also, "Additional Compliance" should not be capitalized.	Insert "The following are" at the beginning of the sentence and delete "are the following" from the end.  Change "Additional Compliance" to lowercase, as follows:  "The following are additional compliance requirements pertaining to lithium batteries:"	Ease of reading Grammar	Adopted-Updated Document
AIR-500	AC 20-184	Page 2-3	Paragraph 2.2.2.1 (below table 1)		"Part" should be plural and lowercase in the second sentence.	Change "part" to "parts" and make it lowercase, as follows:  "... 14 CFR parts 23, 25, 27 and 29."		Adopted-Updated Document
AIR-500	AC 20-184	Page 2-3	Paragraph 2.2.2.1 (below table 1)		In the first sentence of the second paragraph after table 1 (beginning with "A typical special condition..."), the established acronym for MOC is not used.  In the second sentence, there should be a comma after "however".	Delete "means of compliance" and the parentheses around "MOC".  Insert a comma after "however".	Consistent formatting/Grammar	Adopted-Updated Document
AIR-500	AC 20-184	Page 2-4	Paragraph 2.3.1.2.2		"Installation specific" should be hyphenated.	Hyphenate "Installation specific" as follows: "Installation-specific".	Grammar	Adopted-Updated Document
AIR-500	AC 20-184	Page 3-1	Paragraph 3.2 and UNIVERSAL		In the second sentence, there should be a comma after "include" and a comma after "limited to".	Insert a comma after "include" and a comma after "limited to".  Please punctuate similar occurrences throughout the document as follows:  "...include, but not limited to,..."	Grammar	Adopted-Updated Document Checked all document.

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AIR-500	AC 20-184	Page 3-1	Paragraph 3.2.1		"Lithium batteries" is repeated 3 times in this sentence, which makes it difficult to read.	Consider changing to the following: "The electrolyte used in lithium batteries can be a highly reactive substance; <del>and therefore, take care must be observed in</del> maintaining the lithium batteries <del>them</del> in accordance with <del>the lithium batteries their</del> OEM maintenance manuals."	Ease of reading	Adopted-Updated Document
AIR-500	AC 20-184	Page 3-1	Paragraph 3.2.3		In the third sentence, it looks like there is an extra space after "accomplish". It should be deleted.	Delete extra space after "accomplish".	Consistent Formatting	Adopted-Updated Document
AIR-500	AC 20-184	Page 3-2	Paragraph 3.2.8 and UNIVERSAL		The sentence that introduces the list ends with an em dash instead of a colon.	This type of lead-in sentence usually ends with a colon.  RULE: When a complete sentence introduces a list—an independent clause—use a colon. When introducing a list with a dependent clause, use an em dash.  Throughout the document, please change all appropriate occurrences to maintain consistency.	Grammar/Consistent formatting	Adopted-Updated Document Document checked for other occurrences.
AIR-500	AC 20-184	Page 3-3	Paragraph 3.3.7		The first sentence could be clearer	Consider adding an "a" after "in" and changing "potential" to "potentially" for: "...result in a potentially unsafe condition..."	Clarity/Ease of reading	Adopted-Updated Document
AIR-500	AC 20-184	Page A-1	Table A-1		In the top (title) row of the table, there are words that should be hyphenated because they refer to the word "Battery".	'Single Cell' and 'Multi Cell' should be hyphenated as follows:  'Single-Cell' and 'Multi-Cell'.	Grammar/Clarity	Adopted-Updated Document
AIR-500	AC 20-184	Page A-1	Table A-1		<b>Row:</b> "Very Small" <b>Column:</b> "Acceptable Means of Compliance" The font size changes,	Please make the font size uniform.	Clarity/Ease of reading	Adopted-Updated Document

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<b>Phone:</b>			202-267-1639					
AIR-500	AC 20-184	Page A-1	Table A-1		<b>Row:</b> "Large" <b>Column:</b> "Acceptable Means of Compliance" Choice of word "to" following "appendix E" in the second sentence is confusing.	Consider changing the word "to" to "of" after "appendix E" in the second sentence.	Clarity	Adopted-Updated Document
AIR-500	AC 20-184	Page B-2	Section B.3, 4th Item		The URL listed does not link directly to the "Aircraft Materials Fire Test Handbook."	Consider updating the link provided ( <a href="http://www.fire.tc.faa.gov/">http://www.fire.tc.faa.gov/</a> ) to the following:  <a href="http://www.fire.tc.faa.gov/handbook.stm">http://www.fire.tc.faa.gov/handbook.stm</a>	Accuracy of information	Adopted-Updated Document
AIR-500	AC 20-184	Page B-3	Section B.5 6th Item		In the title of "RTCA DO-347, Certification Test Guidance for Small and Medium Rechargeable Lithium Batteries and battery Systems," "battery" is not capitalized.  Also, remove period after the same title.	Capitalize "battery" in the title of "RCTA DO-347." Remove period at the end of "RCTA DO-347 Certification Test Guidance for Small and Medium Rechargeable Lithium Batteries and battery Systems."	Grammar/Consistent formatting	Adopted-Updated Document
AIR-500	AC 20-184	Page D-1	Paragraph 3 under "Special Condition Requirement #3"		In the first sentence, there is a hyphen missing between "worst" and "case".	"Worst case" should be hyphenated as follows because it refers to "failure conditions":  "worst-case"	Grammar/Clarity	Adopted-Updated Document

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AIR-500	AC 20-184	Page D-1 and D-2	Paragraph 4 under "Special Condition Requirement #3"		The third, fourth, and fifth sentences in this paragraph are confusing. It might be easier for the reader to understand if it was formatted as a list.	Please consider re-formatting the second, third, fourth, and fifth sentences as follows (if it makes sense):  "The installer should work with the manufacturer to quantify and mitigate the effects of hazardous emissions by—  • Ensuring that the aircraft installation is compatible with the emissions and temperatures that the battery or battery system may generate during any failure condition; • Accommodating any venting provisions on the battery or battery system, as applicable; • Providing containment of electrolyte leakage, toxic or explosive gases, and debris as	Clarity	Non-Concur There is no change in meaning or context. Does not modify intent of the requirement or add any clarity to existing text.
AIR-500	AC 20-184	Page D-3	Paragraph 2 under "For Part 27"		In the second sentence of the second paragraph (the last sentence in the section) the comma after "(c)" is unnecessary.	Delete comma after "(c)".	Grammar	Non-Concur The © relates to the FAR part and need to be there.
AIR-500	AC 20-184	Page D-3	Paragraph 1 under "Special Condition Requirement #7" and UNIVERSAL		In the first sentence in the first paragraph, there is a misplaced comma before "so as."	Strike the comma for:  "...of the battery automatically so as to..."	Ease of reading	Non-Concur This is the text that was in the NPRM for the special condition of the 787. Therefore kept text as same as published NPRM.
AIR-500	AC 20-184	Page D-3	Paragraph 5 under "Special Condition Requirement #7"		There appears to be an extra space between "This" and "includes" in the second sentence of the fifth paragraph.	Delete extra space between "This" and "includes".	Consistent Formatting	Adopted- Updated Document.

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AIR-500	AC 20-184	Page D-4	Paragraph 1 under "Special Condition Requirement #9"		<p>The first sentence in the first paragraph is confusing. The reader may not understand to what the phrase "that contain the rechargeable lithium batteries and lithium battery system" refers.</p> <p>Also, the word "assure" is used, but "ensure" is correct in this instance.</p>	<p>Please reword the first sentence so that it is clear to what "that contain the rechargeable lithium batteries and lithium battery system" refers.</p> <p>Also, consider changing "assure" to "ensure". While these words are often used interchangeably, "ensure" is a better word for this application. Please replace "assure" with "ensure" as per the following rule:</p> <p><b>Assure</b> – to tell someone something positively or confidently to dispel doubt or anxiety. It is to promise or pledge to someone so as to remove doubt or anxiety.</p> <p><b>Ensure</b> – to make certain that some outcome shall occur or be the case. It is something you do to guarantee or confirm an event, condition, or outcome.</p> <p>You can take action to ensure you'll have enough food for the weekend.</p>	Clarity/Ease of reading	Non Concur- This is the released Special Condition that was part of an NPRM
AIR-500	AC 20-184	Page D-4	Paragraph 1 under "Special Condition Requirement #9"		<p>The word "instructions" is repeated in the fifth sentence (last sentence) of the first paragraph. This is awkward and could be confusing for the reader.</p>	<p>Consider rewording the last sentence as follows:</p> <p>"Precautions should be included in the <del>instructions for</del> continued airworthiness maintenance instructions to prevent mishandling of the rechargeable lithium battery and rechargeable lithium battery systems..."</p>	Clarity/Ease of reading	Non Concur- This is the released Special Condition that was part of an NPRM

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<b>Organization:</b>			Norman Pereira, AIR-130, Section 133					
<b>Phone:</b>			202-267-1639					
AIR-500	AC 20-184	Page D-4	Paragraph 2 under "Special Condition Requirement #9"		In the second sentence of the second paragraph, there is a comma missing after "addressed".	Replace "assure" with "ensure." "Insert a comma after "addressed," for: "...must be addressed, including any..."	Grammar	Non Concur- This is the released Special Condition that was part of an NPRM
AIR-500	AC 20-184	Page E-1	First sentence under appendix title		This first sentence under the appendix title ends with a period but, because it introduces a list, should end with a colon.	Replace period at the end of the sentence with a colon as follows: "Provide the following information to the applicable Aircraft Certification Office along with your compliance data:"	Grammar	Adopted-Updated Document
AIR-500	AC 20-184	Page E-1 under	"Acceptable Method of Compliance for Special Condition Requirement #1" and UNIVERSAL		Section titles ("Charging and Discharging Protection," etc.) should be left-aligned.	Ensure that section titles are aligned as below here and throughout the document:  1.5.2 Charging... 1.5.3 Mitigation... 1.5.5 Flammability 1.6 Design Criteria 1.7 Design Guidelines 2.1 Test Conditions... 2.3.7 Short-circuit... 2.3.8 Short-circuit... 2.3.9 Short-circuit...	Consistent Formatting	
AIR-500	AC 20-184	Page E-3 list item c) under	"Acceptable Method of Compliance for Special Condition Requirement #4" and UNIVERSAL		"Lithium" is capitalized.	Change "Lithium" to "lithium" here and throughout the document (unless it is used at the beginning of a sentence or in a title).	Consistent Formatting	Adopted-Updated Document



[For detailed instructions on how to fill out the columns below, please see the Instructions sheet.](#)

<b>Comments Submitted By:</b>			Field Comment Disposition					
<b>Organization:</b>			Norman Pereira, AIR-130, Section 133					
<b>Phone:</b>			202-267-1639					
AIR-500	AC 20-184	Page E-4	"Acceptable Method of Compliance for Special Condition Requirement #6"		"Compliance" and "Requirement" are not capitalized in the section header "Acceptable Method of compliance for Special Condition requirement #6".	Capitalize "compliance" and "requirement" in the section header as follows: "Acceptable Method of Compliance for Special Condition Requirement #6".	Consistent Formatting	Adopted-Updated Document
AIR-500	AC 20-184	Page F-1	Paragraph 1		This first sentence ends with a period but, because it introduces a list, should end with a colon.	Replace period at the end of the sentence with a colon as follows:  "Provide the following...data:"	Grammar	Adopted-Updated Document
AIR-500	AC 20-184	Page F-3	Paragraph b. under "Acceptable Method of Compliance for Special Condition #3"		The period is missing after "requirement #3" in list item b.	Insert period after "...compliance to requirement #3" at the end of list item b.	Consistent Formatting	Adopted-Updated Document
AIR-500	AC 20-184	Page F-3	Paragraph b. under "Acceptable Method of Compliance for Special Condition #4"		The period is missing at the end of list item b.  Also, list item c. differs in structure from items a. and b.  A comma is needed after "which" if this sentence structure is kept.  The § symbol is missing before "25.863."	Insert period after "...compliance to requirement #4" at the end of list item b.  Consider restructuring list item c. as follows:  "c) Applicants must show compliance with § 25.863 because lithium batteries and battery systems contain high energy, which can be a source of flammable liquid."	Grammar/Ease of reading	Adopted-Updated Document